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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/763,068 | 01/22/2004 | Xiaogang Peng | 40715-296579 | 3712 |
| 23370 7590 04/02/2007 JOHN S. PRATT, ESQ KILPATRICK STOCKTON, LLP 1100 PEACHTREE STREET ATLANTA, GA 30309 | | | EXAMINER TSOY, ELENA | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1762 | |
| SHORTENED STATUTORY PERIOD OF RESPONSE | | MAIL DATE | DELIVERY MODE | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/763,068

Applicant(s)

PENG ET AL

Examiner

Elena Tsoy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-98 and 100-108 is/are pending in the application.
- 4a) Of the above claim(s) 1-57, 69-98 and 100-108 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 58-68 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/14/04.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 58-68 in the reply filed on 2/26/2007 is acknowledged. The traversal is on the ground(s) that conducting a search on all claims would not be unduly burdensome on the Examiner. This is not found persuasive because the search on all claims would require searches of different subject matter, and, thus, conducting a search on all claims would be unduly burdensome on the examiner.

The requirement is still deemed proper and is therefore made FINAL.

Claims 1-98, and 100-108 are pending in the application. Claim 99 has been cancelled. Claims 1-57, 69-98, and 100-108 are withdrawn from consideration as directed to a non-elected invention.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 58-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reiss et al (*Nano Letters*, 2 (7), 781 -784, 2002) in view of Kondow et al (US 5300793) and Nicolau (US 4675207).

Reiss et al disclose a method for preparing CdSe/ZnSe (claimed formula M^1X^1/M^2X^2) core/shell nanocrystals having impressively high photoluminescence (PL) efficiency (See Abstract) comprising slowly injecting a mixture of a solution of ZnO complexed with

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dodecylphosphonic acid or zinc stearate in toluene as the zinc precursor and a solution of TOPSe (Se-trioctylphosphine) in TOP into a solution of CdSe core nanocrystals in HAD (hexadecylamine)/TOPO (trioctylphosphine oxide) (See page 781, second paragraph) (See page 782, second paragraph, page 783, reference (24)).

Reiss et al fail to teach that the shell is formed by applying a cation (M^2) precursor and an anion (X^2) precursor) separately from each other in an alternating manner (Claim 58).

Kondow et al teach that atomic-layer-epitaxy (ALE) technique providing cationic and anionic species in an alternating manner permits epitaxial growth in the crystal structure converted from the bulk state, thereby realizing a hetero crystalline juncture (See column 3, lines 42-47), whereas the liquid phase epitaxial growth technique wherein a large amount of anion atoms and cation atoms are *simultaneously* supplied to the growing surface, the probability that the supplied anion atoms and cation atoms are bonded with each other is much higher than the probability that the supplied cation atoms (or anion atoms) are bonded to the anion atoms (or cation atoms) on the growing surface, thus making it impossible to realize intended epitaxial growth (See column 3, lines 56-66). Kondow et al fail to teach that deposition in solution with providing cationic and anionic constituents in an alternating manner would also permit to realize intended epitaxial growth. However, Nicolau teaches that deposition in solution with providing cationic and anionic constituents in an alternating manner permits deposition of monocrystalline or polycrystalline, fault-free, compact layers of compounds of formula C_mA_n (C represents a cation, A represents an anion) having *homogeneous* thickness and desired *stoichiometry* of the deposited compounds in contrast to the presently known processes such as vapour phase deposition and deposition in solution with simultaneous addition of cationic and anionic constituents (See column 1, lines 23-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to prepared M^1X^1/M^2X^2 core/shell nanocrystals of Reiss et al using a deposition in solution with providing cationic and anionic constituents in an alternating manner with the expectation of providing the desired monocrystalline or polycrystalline, fault-free, compact layers of *homogeneous* thickness and desired *stoichiometry* of the deposited compounds, as taught by Kondow et al and Nicolau.

As to claims 61-62, Kondow et al teach that the core may be of zincblende-structure and the wurtzite-structure (See Figs. 1-2). Either a semiconductor thin film of the wurtzite-structure may be formed on the semiconductor single crystal substrate of zincblende-structure (See column 2, lines 1-6) by adding first a cation constituent (See column 2, lines 47-59), or a semiconductor thin film of the zincblende-structure may be formed on the substrate of wurtzite-structure (See column 2, lines 7-10). Therefore, it would have been obvious to one of ordinary skill in the art to add first an anion constituent for growing a film on the substrate of wurtzite-structure.

As to claim 63, Reiss et al teach that structural defects in the shell low fluorescence quantum yield (See page 781, paragraph 1). Obviously, any impurities would act as structural defects in the shell. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have purified a core/shell nanocrystal in the cited prior art with the expectation of providing the desired maximum fluorescence quantum yield.

As to claim 65-68, Nicolau teaches that substrates may be monocrystalline metallic substrates, e.g. of Zn or Cd, monocrystalline semiconductor substrates, e.g. of Ge, GaAs or InP (See column 6, lines 3-10), and precursors for the formation of ionic layers are preferably salts such as **zinc suphate** (See column 9, line 64), complexes or compounds *dissolved* in any solvent, e.g. water, organic solvents or mixtures of the water and organic solvent, where the salts,

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compounds or complexes present in these solutions can be in the dissociated state (See column 6, lines 14-36). In the solutions, the cationic or anionic constituents can be present in the form of a complex with an appropriate ligand, e.g. ammonia, which is soluble in the solution (See column 6, lines 30-33).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Thursday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy
Primary Examiner
Art Unit 1762

ELENA TSOY
PRIMARY EXAMINER
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March 29, 2007